PATENT ABSTRACTS OF JAPAN

(54) PORTABLE GPS NAVIGATION SYSTEM

(57)Abstract:
PROBLEM TO BE SOLVED: To enable always surely confirm one's own current
position with small size and light weight by including a paging means capable
of receiving information datamessageetc.through broadcasting.
SOLUTION: This system is provided with a GPS antennaan FM receiving antennaa
main CPUa main storage devicea paging function part 13etc. The paging function
part 13 fulfills a kind of information retrieval functionand visually obtains
various kinds of information. From a GPS(global positioning system)
satelliteGPS data are sent to the main CPU 7 through the GPS antenna 2 and a
GPS receiver 3. From an FM transmitting station corresponding a present
positionDGPS data are transmitted to the CPU 7 through the FM antenna 5.
Desired bar code information are readsubjected to decipher processing on the
basis of relative application program in the main CPU 7 and the main storage
device 11temporarily stored in the main storage device 11 after character
conversion process 7Aand displayed on an LCD display part 10.

CLAIMS

[Claim(s)]
[Claim 1]A GPS signal receiving antenna and a receiver which accepts said GPS signalCPU which processes a signal from said receiverand a memory which memorizes necessary data etc. In a portable GPS navigation system in which a displaying means which displays necessary map dataposition dataetc. an interfacing means which incorporates various data into said CPUand a power supply section andwere really formedA portable GPS navigation system characterized by what a pager means which can receive information dataa messageetc. through broadcast etc. is built in for.
[Claim 2]A portable GPS navigation system which constitutes a pager means from an IC cardmakes it removable to the system concerned in the portable GPS navigation system according to claim 1 by predetermined interfacing meanssuch as PCMCIAand is characterized by things.
[Claim 3]A portable GPS navigation system which builds in a tone dialler function part in the portable GPS navigation system according to claim 1and is characterized by things.
[Claim 4]A portable GPS navigation system which builds in a modem for data communications in the portable GPS navigation system according to claim 1and is characterized by things.
[Claim 5]A portable GPS navigation system which said modem for data communications makes it removable to the system concerned in the portable GPS navigation system according to claim 4 by predetermined interfacing meanssuch as PCMCIAand is characterized by things.
[Claim 6]A portable GPS navigation system characterized by what a format of map data for a display was made into a bit map data format for in a portable GPS navigation system given in any 1 paragraph of claims 1-5.
[Claim 7]In a portable GPS navigation system given in any 1 paragraph of claims 1-6A portable GPS navigation system characterized by built-in or things including a receiving antenna of a DGPS signalan FM tuner for receiving said DGPS signaland a predetermined decoder made removable.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]If this invention relates to the GPS navigation system using GPS (Global Positioning System) art and it says more detailsit relates to the portable GPS navigation system which a pedestrian can carry and can be used conveniently.
[0002]

[Description of the Prior Art]As a conventional navigation system using GPS artwhat is called the car navigation system and the portable system for vehicles are used widely. Although it sets it as the 1st purpose that such a GPS technical utilizing means originally checks a user's own (self) existence positionIn order to tell the other party about a self current position (the 2nd purpose)For examplein the GPS navigation system of a personal computer base which is represented by the allocation-of-cars system of a taxithe desired end can be achieved by passing the data communications by a cellular phonePHSthe telephone network that stands in a row in theseetc.

[0003]Howeverthe system from such the former is unsuitable for a cellular phone like a large-scale business-use system and a desktop PC.
Although the expected function could also be achieved by post-installing a GPS function in PDA or a notebook sized personal computerwhile becoming expensive as a resultit was still unsuitable also for the cellular phoneand practical availability was also low.

[0004]If it is in the portable navigation system and car navigation by which the present business is carried outit does not have the function to give the other party a self current position.

[0005]As information which should be displayed on a systemtraffic information and various kinds of event information can be considered in addition to such self present position information. Although it has realized about traffic information in the system which already used FM broadcasting firstAbout said various kinds of event informationthe waiting time of the attraction in vast area like various theme parksthe confusion situation of a restaurantetc. for exampleIt cannot checkif it does not go to the spotand neither the enforcement time of a parade nor its moving trucking can be known if a guidance pamphlet like a programetc. do not come to hand.

[0006]

[Problem(s) to be Solved by the Invention]as described abovein this conventional kind of artwhat what is called a car navigation system for vehicles is used extensivelyand was functionally limited as a portable thing.
[use however] Since a comparatively bulky thing of form like CD-ROM or DVD-ROM is used abundantly as a medium which accumulates map information externally and it becomes large-sized as a wholeAs portableuser-friendliness was badand in order that power consumption might also increasemany large-sized cells had to be preparedand there was a fault point plentifully.

[0007]Although it is necessary to obtain pamphlets beforehand and to examine the contents to not have a function for incorporating various kinds of traffic information and event informationfor exampletry to go to a desired theme parkAfter that day cameeven if the contents of the event had changedthere was

fault that it could not conform to this.
[0008]
[Means for Solving the Problem]This invention is made in order to solve the above-mentioned technical problemand it is a thing of the following composition.
[0009](1) A GPS signal receiving antenna and a receiver which accepts said GPS signalCPU which processes a signal from said receiverand a memory which memorizes necessary data etc.In a portable GPS navigation system in which a displaying means which displays necessary map dataposition dataetc.an interfacing means which incorporates various data into said CPUand a power supply section andwere really formedA portable GPS navigation system characterized by what a pager means which can receive information dataa messageetc. through broadcast etc. is built in for.
[0010](2) A portable GPS navigation system of (1) which constitutes a pager means from an IC cardmakes it removable to the system concerned by predetermined interfacing meanssuch as PCMCIAand is characterized by things.
[0011](3) A portable GPS navigation system of (1) which builds in a tone dialler function part and is characterized by things.
[0012](4) A portable GPS navigation system of (1) which builds in a modem for data communications and is characterized by things.
[0013](5) A portable GPS navigation system of (4) which said modem for data communications makes it removable to the system concerned by predetermined interfacing meanssuch as PCMCIAand is characterized by things.
[0014](6) A portable GPS navigation system in either of (1) – (5) characterized by what a format of map data for a display was made into a bit map data format for.
[0015](7) A portable GPS navigation system [in / including a receiving antenna of a DGPS signalan FM tuner for receiving said DGPS signaland a predetermined decoder / either built-in or (1) – (6) made removable].
[0016]
[Embodiment of the Invention]The portable GPS navigation system of this invention really makes composition collectively a GPS antennaa GPS receiverCPUa memorya display for indication (MEANS)an interfacethe IC card for map dataand a power supply.
[0017]According to this inventionsince what is called a pager means (or modem) is built in or it is made removabledirect reception of various kinds of information emitted from the institution of the request with a theme park etc. can be carried out. And the theme park pertinent information which was carried out in this way and received can be checked using the displaying means in a system.
[0018]Since it is premised on a pedestrian doing portable use of this

inventionhow of the grade of the original accuracy of position becomes a
problem as a more important factor. however -- present -- the accuracy error
of this kind of business of GPS navigation system is an about [**150m]
thingand there is a difficulty that an error is too large in a pedestrian
using. however -- DGPS (Differential Global Positioning System) -- according
to the systemalso in a portable casein order that the accuracy error may go up
to about **4-6mpractical use can fully be presented. Thenaccording to this
inventiona fully practical portable GPS navigation system is realizable by
using a DGPS-type system together to a GPS-type system.
[0019]
[Example]Drawing 1 is an outline lineblock diagram of the portable GPS
navigation system 100 concerning one example of this invention. In this
drawing 1what is provided in that casing 100AIt is GPS receiving antenna 2 for
receiving the required signal from the GPS Satellite (herenot shown) arranged
in the universe (sky)and this is made pivotable around the shaft which is not
illustrated so that the signal from said GPS Satellite can be received
suitably. The indicator 10 is a thing of for exampleLCD compositionand map
information including person having's current position and destination
position of the system 100 concerned is displayed with required text. The
final controlling element 12 contains various function keysand achieves
various functionssuch as starting and a stop of the system 100selectiona
display change of the display information on the indicator 10. The map data
card slot 100B is a part which inserts the below-mentioned map data cardand
after it inserts a necessary map data cardit displays the map information of
relation on said indicator 10. The bar code reader part 100C is for reading
the bar code information established corresponding to the existence position
of a theatera stadiumrecreation facilitiesa theme parka department storea
supermarketa restaurantetc. which are recordedfor example on the guidebook for
sightseeing.
The bar code information corresponding to a desired place is read in the
system 100and it is used in order to check various kinds of information
content (for examplewaiting time of the recreation facilities of a request of
a theme park) about the institution in the place of said request.

[0020]Drawing 2 is a block diagram of the portable GPS navigation system 100
concerning the above-mentioned example. In this drawing 2it is launched and
arranged in the proper place of the universeandunder the present
circumstancesas for GPS Satellite 124 pieces are arranged and employed. By
receiving the data from at least three pieces in this GPS Satellite 1it can
have predetermined accuracy and the current position of the addressee
concerned can be known. The GPS antenna 2 is for receiving the data from said

GPS Satellite 1.
The data received here is sent to the GPS receiver 3 of the next step.
The GPS receiver 3 contains RF function part and ASIC (Application Specific IC: a kind of custom IC).
Based on said received datathe person having concernedsuch as a state of the lat/long about person having's existence positiona directionspeedan altitudetimeand a satellitechecks a self existence positionand incorporates useful information in the meaning which gives aim about a destination.
Howeverperson having here is [sake / when substituting the car navigation as a mounted type system] convenient when the person having concerned moves by vehiclesalthough the speed information or altitude information do not become useful in particularsince it is a pedestrian. The FM transmission antenna 4 is what is called the existing thing with which the FM-broadcasting office of every place was equipped.
It was not directly attached to the system 100 here.
The FM reception antenna 5 achieves the function to receive the teletext (DARC method) electric wave by the predetermined FM station of said FM transmission antenna 4.
The DGPS data in said teletext is received in latter FM tuner 6 via the FM reception antenna 5.
Although main part CPU7 controls operation of the system 100 wholeit may compute person having's current position more precisely as the important function based on the GPS data from the GPS receiver 3and the DGPS data from FM tuner 6. PCMCIA8 is a kind of interface function partreceives below-mentioned PC card 9and incorporates into main part CPU7 in the system 100 the map information accumulated in it. PC card 9 is a kind of external memory which accumulated the map data of every placeand it is used according to person having's current positionchoosing what has accumulated relevant map data. The indicator 10 comprises a LCD memberfor example.
Map information including the system's 100 the current position and destination position of person having is displayed with required text.
The body memory 11 contains the RAM function part which accumulates temporarily the start data concerning processing and intermediate data of the GPS-data relation incorporated from the GPS antenna 2and the ROM-function part which accumulates various kinds of programs which manage operation of the system 100 whole. The final controlling element 12 contains various function keysand achieves functionssuch as starting and a stop of the system 100selectiona display change of the display information on the indicator 10.
The pager function part 13 achieves the function of a kind of information retrieval.
For examplevarious kinds of informationincluding the waiting time in the

present of the recreation facilities of the hope in a desired theme parkthe
contents of operating of an attached restaurantetc. can be acquired visually.
This pager function part 13 is also replaceable with the gestalt which built
in the modem for data communications. The tone dialler function part 14
achieves the function to output necessary information by phonetic formor to
dischargefor example as FM radio and to tell the desired other party
information content concerned. The power supply section 15 supplies the
operation energy of the system 100 whole.
Various kinds of suitable batteries which generally contain a rechargeable
battery are used.

[0021]Drawing 3 is an outline lineblock diagram centering on the pager
function part 13 which touched by said drawing 2. In this drawing 3the GPS
data from GPS Satellite 1 (drawing 2) are sent to main part CPU7 via the GPS
antenna 2 and the GPS receiver 3. The DGPS data from the FM transmitting
station corresponding to system person having's current position is sent to
main part CPU7 via the FM reception antenna 5 and FM tuner 6. And the map data
accumulated in PC card 9 is transmitted to main part CPU7 via PCMCIA as an
interface function part. Although this is the focus of the pager function part
13For examplethe correspondence bar code information of desired theme park-
related pamphletsIt is read by the bar code reader 100C (drawing 1)and based
on the application program of the relation in main part CPU7 and the body
memory 11After decipherment processing is carried out in the signal decoder 6A
and transliteration processing 7A is performedwhile being temporarily
accumulated in the predetermined accumulating part of the body memory 11it is
displayed on LCD display 10. Hereas for the display as which it decodes and
"be [it / now / the 15 minute waiting 10C]" Comes to display said bar code
information in "the theme park 10A"the "restaurant 10B"etc. the present
condition information from the theme park concerned is decoded and displayed.
[0022]In the portable GPS navigation system 100 concerning the above-mentioned
exampledrawing 4 is an outline illustration figure of the thing accompanied by
the pager function concerning said drawing 3. In this drawing 4the upper part
of the casing 100A is equipped with GPS receiving antenna 2enabling free
rotationand LCD display 10 is arranged in that pars intermediaand various
kinds of final controlling elements 12 are formed in that lower part. About
operation of a pager function hereit is ending with explanation in said
drawing 3and the explanation beyond this is omitted.
[0023]In the portable GPS navigation system 100 concerning the above-mentioned
exampledrawing 5 is a use illustration figure of the thing accompanied by the
pager function concerning said drawing 3. It is made for the undersurface part
of the system 100 to have the bar code B corresponding to the position

information on the place (for examplerestaurant in a certain predetermined
theme park) of the request in the pamphlet P read in this drawing 5. In this
drawing 5GPS receiving antenna 2LCD display 10and the final controlling
element 12 are the same as that of the thing in said drawing 4.
[0024]In the portable GPS navigation system 100 concerning the above-mentioned
exampledrawing 6 is a composition illustration figure which attaches a tone
dialler function part. In this drawing 6there is no difference in appearance
between the examples of drawing 1 except for the speaker 14G for tone
generating being formed in the flank of the casing 100A.
[0025]Drawing 7 is an outline lineblock diagram centering on the tone dialler
function part 14 which touched by said drawing 2. In this drawing 7main part
CPU7 based on the desired processed data and application program from the
position information side from the GPS receiver 3 sideand the body memory 11
sideFrom displaying for examplea kana character row sequence on LCD display
10when this is a thing of a touchpad typethe kana character "A" is inputted by
touching a correspondence screen with a fingerfor example (14B). (14A) After
performing such operation as requiredthose selections and decision are made
using the predetermined function key in the final controlling element on a
system (14C)and it changes into the code corresponding to said selection and
the determined kana character string "for exampleASAKUSA" after this (14D).
And a tone is generated according to this (14E)and voice response is carried
out via a loudspeaker from being amplified suitably (14G). (14F) Since FM etc.
are modulated as a gestalt of an information output here about the information
which carried out code conversion (14D)it can discharge via the transmission
antenna which is not illustratedand the desired other party can be made to
receive.
[0026]In the portable GPS navigation system 100 concerning the above-mentioned
exampledrawing 8 is a composition illustration figure of a receiving function
part used corresponding to what attaches a tone dialler function part (see
drawing 6). In this drawing 8it is received by the telephone 15A and the code
information transmitted from said drawing 7 side is given to the decoder 15C
via the modem 15B of correspondence. said received code information is changed
into the text and position information on correspondence hereand is displayed
as the other party current position XX here -- on LCD display 10A via main
part CPU7A. That by which map information other than this and the addressee
side current position YY are included in the body memory 11A will be chosen
and displayed. Herewhen both position is separated so that said two sorts of
current positions XX and YY are not displayed on the same screenthe coded data
about the other party current position is displayed on a screenand the current
position of said other party can be given as the longitude and latitude
information on correspondence.

[0027]Drawing 9 is a composition 9A illustration figure of the map data in PC card 9 as external memory which touched by said drawing 2and the data storage capacity is made into about 2 MB of thing. In this drawing 9the offer map information area 9B is created according to an administrative districtfor examplethe map information about TokyoChuo-kuand the Ginza area is created and accumulated. It is made for the offer map area 9C to have the coordinate conversion information about an object map accumulated.
The information about the contraction scale of the optimal map for system person having using it in a current positionetc. is accumulated.
The formed data area 9D creates and accumulates name characters in an object mapsuch as a building and a crossingetc. by bit map formator creates and stores the data corresponding to the representative fraction which is a grade of the contraction scale in said offer map area 9C. About name characterssuch as said building and a crossingthe priority is defined beforehandand it is suitably selected according to the grade of a contraction scale of a map. The index data area 9E creates and accumulates the index data corresponding to the target building in object map itself or the map concernedetc.
Based on this index datavarious kinds of data relevant to a target can be taken out easily and certainly.
The data area 9F for locus preservation saves the past locus of the time of for 5 minutes going back about system person having's moving trucking and moving trackfor examplein view of this time.
It is suitable to check the course of the past movement.
About map data present in usethe FM station frequency data area 9G accumulates the frequency data of the suitable FM stationin order to use DGPS data.
Supposing there are three games in an usable stateit can choose and examine one by one like 1 to "2-3"for exampleand can be used in itbeing able to choose the FM station of the best state.

[0028]When drawing 10 carries the portable GPS navigation system 100 concerning the above-mentioned example and movesit is an illustration figure of the map which appears in an LCD display one by one. This drawing 10 shows the example of a move in the Ginza area in Chuo-kuTokyothe screen at the time of a move start is GAand fairly wide ranges including a destination are shown. Hereafterit changes from GC from GB one by one like GD as person having moves. In the example of this drawing 10the both sides of person having's current position PP and the destination (destination) OP are displayed on the screen. Herewhen the destination (destination) OP is in distance to the extent that it cannot display on a screenthe program coping with this is beforehand accumulated in the body memory in a systemand the management measure in which an arrow is displayed in the direction which points out the destination

(destination) OP from the current position PP can be taken.

[0029]In the portable GPS navigation system 100 concerning the above-mentioned exampledrawing 11 is an illustration figure of the area which can receive DGPS. In this drawing 11since person having's current position PP and the both sides of the destination (destination) OP are in the ready-for-receiving ability area which becomes FM1the DGPS signal from the FM station corresponding to this can be used together with a GPS signaland expected accuracy of position can be brought about. Herewhen two or more FM stations which can receive exist and there are three games in an usable state as it explained in said drawing 8 for exampleit can choose and examine one by one like 1 to "2-3"and can be usedbeing able to choose the FM station of the best state.

[0030]Herethe suitable example of operation in the above-mentioned example of this invention is explained.

[0031]Firstit is assumed that it is acting after two persons (AB) who carried to each have left the system of each other by the above-mentioned example in a a certain predetermined open-space type theme park. Heresupposing A needs to carry out a certain connection to BA will start its systemwill operate a tone dialler function partand will send self currency information. This sent position information is received by the other party's B systemand the current position of said A is displayed on the indicator of the B side system.

[0032]Even if it is going to use such a system in a closed space type institution (institution with a roof)GPS information from the sky cannot be used directly. Howeversince the DGPS information based on FM broadcasting can be usedit can carry out the same use as the case of an open-space type institution by incorporating the GPS information corresponding to the position information on the institution concerned (for examplecenter position information).

[0033]
[Effect of the Invention]As explained in full detail abovewhile according to this invention being able to provide a GPS navigation system small and lightweightand portable and always being able to grasp a self current position certainlythe information about the point of a request of a theme park and others is also acquirable.

[0034]Since it replaces with conventional CD-ROM and DVD-ROM and a small lightweight thing like an IC memory is used as a means for accumulating map informationthe capacity and weight as the whole system become small and light as a wholeand the user-friendliness improves remarkably.

[0035]According to the system of this inventiondirect reception of various kinds of information emittedfor example from the institution of a request like a theme park in a pager means (or modem) built-in - or since it is made removable can be carried out. And the theme park pertinent information which

was carried out in this way and received can be checked using the displaying means in a system.

[0036]Since the system by this invention has taken the gestalt which uses a DGPS-type system together to a GPS-type systemthe accuracy error is suppressed even to about **4-6mand sufficient practicality is guaranteed so that suitably for a pedestrian to use.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]It is an outline lineblock diagram of the portable GPS navigation system 100 concerning one example of this invention.
[Drawing 2]It is a block diagram of the portable GPS navigation system 100 concerning the above-mentioned example.
[Drawing 3]It is an outline lineblock diagram centering on the pager function part 13 which touched by said drawing 2.
[Drawing 4]It is an outline illustration figure of said pager function.
[Drawing 5]It is a use illustration figure of the thing accompanied by a pager function. It is an outline lineblock diagram of the tone dialler function part 14.
[Drawing 6]In the above-mentioned exampleit is a composition illustration figure which attaches a tone dialler function part.
[Drawing 7]It is an outline lineblock diagram centering on the tone dialler function part 14.
[Drawing 8]In the above-mentioned exampleit is a composition illustration figure of a receiving function part used corresponding to what attaches said tone dialler function part.
[Drawing 9]It is a composition illustration figure of the map data in PC card 9 as external memory.
[Drawing 10]When carrying the system concerning the above-mentioned example and movingit is an illustration figure of the map which appears in an LCD display one by one.
[Drawing 11]In the system concerning the above-mentioned exampleit is an illustration figure of the area which can receive DGPS.
[Description of Notations]
2: GPS antenna
3: GPS receiver
5: FM reception antenna
6: FM tuner
7: Main part CPU

8: PCMCIA (interface)
9: PC card
10: LCD display
11: Body memory
12: Final controlling element
13: Pager function part
14: Tone dialler function part
15: Power supply section.